CONTRACTOR SAMPLING AND ANALYSIS PLAN
SOIL AND DEBRIS REMOVAL ACTION
CAMP ALLEN LANDFILL AREA B
NAVAL BASE
NORFOLK, VIRGINIA

Prepared for:

Department of the Navy
Naval Facilities Engineering Command
Atlantic Division Naval Station
Norfolk, Virginia

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1.0 INTRODUCTION

OHM Remediation Services Corp. (OHM), a wholly owned subsidiary of OHM Corporation, is pleased to submit this sampling and analysis plan for the soil and debris removal action at the Camp Allen Landfill, Area B, Norfolk Naval Station in Norfolk, Virginia. The activities described herein are to be conducted as part of the tasks required by the Department of the Navy (the Navy) under Contract No. N62470-93-D-3032. The contents of this sampling and analysis plan follow the requirements as stated in the revised Statement of Work (SOW) dated September 1, 1993, as set forth by the Navy. Supporting this sampling plan are the Work Plan, Contractor Quality Control Plan (CQCP), and Health and Safety Plan.

During implementation of this plan, the most current USEPA procedures will be followed and quality control will be performed in accordance with the CQCP.

This sampling plan details the sampling involved for the following components of the project:

- Pre-removal action sampling and analysis of the proposed excavation areas to obtain waste disposal facility approval.
- Soil/sediment in the excavation walls and bases in the seven contaminated soil/debris areas as identified in the SOW.
- Water collected from dewatering the excavation and any surface water runon to the project work areas.
- Water collected from the drying pad
- Decontamination water
- Influent to the on-site water treatment plant
- Effluent from the effluent tank
- Investigative-derived waste
- Borrow fill material.

The sampling procedures, number of samples to be collected, cleanup levels, and chemical and/or geotechnical analyses required are discussed in the following sections. In addition, field screening will be performed as discussed in Section 2.0 in the excavated areas to help delineate the limits of contamination.

2.0 FIELD SCREENING

Field screening for total organic vapors will be performed using an HNU photoionization detector (PID) coupled with visual inspection for stained soils and/or exposed debris within the excavated areas. Prior to field screening in the excavated areas, the PID will be used to establish background conditions. Background readings will be documented over the areas to be excavated and at upwind and downwind vicinity locations to be determined in the field.

After the areas are excavated to the preliminary vertical limits defined in the SOW and at the horizontal limits where side slopes are determined to be stable, field screening will begin. As stated in the Work Plan, Areas 1 and 2 will each be excavated to a preliminary vertical depth of 1 foot, Areas 3, 4, 5, and 6 to a vertical depth of 8 feet, and Area 7 to a vertical depth of 5 feet. All areas excluding Areas 1 and 2 will be excavated to the preliminary horizontal limits based on 1V:1H side slopes.

Once the preliminary vertical and horizontal limits of the excavation are determined to be stable, field screening of soils will be performed along the walls and base of the excavation. Screening of walls and base will be performed in two steps. The excavator will assist in the field screening by obtaining discrete samples from the walls and base every 25 feet. No one will enter the excavation during any portion of the soil sampling. The field screening technician will take a reading from each bucket of soil for each discrete sampling location.

All samples with PID readings between background and 50 ppm will receive head space analysis. Samples for headspace analysis will also be collected from each bucket by scooping a soil sample into an 8-ounce glass jar. Samples will be carefully collected into the glass jar using a spoon in a manner which causes minimal disturbance to the sample and then quickly sealed with aluminum foil and metal lid. The closed samples will be allowed to set for at least 10 minutes before removing the lid and inserting the PID probe through the aluminum foil into the headspace and recording the results.

When PID readings (including both headspace and ambient) are below 50 ppm, and there are no visually stained soil or exposed debris, then excavation will stop and OHM will perform field screening for metallic objects potentially buried beneath excavation limits to determine whether to take confirmatory sampling. A ferrous metal magnetometer will be used for magnetic screening. The Navy's technical representative (NTR) will be informed of the results and will authorize collection of confirmatory soil samples, as needed, or the additional excavation if metal is detected. Upon review that confirmatory samples are below the cleanup levels discussed in Section 3.0, OHM will inform the NTR who will authorize backfilling.

Upon reaching the preliminary limits of excavation and if various portions do not pass the field screens, by visual air monitoring and/or with the magnetometer, OHM will confer with the NTR to define the new limit of excavation in these areas. Once the area passes

the field screens, the NTR will be advised and confirmatory samples will be collected. If the confirmatory samples do not meet the cleanup criteria, OHM will confer with the NTR to define the new limit of excavation. In all cases, OHM will obtain NTR authorization prior to proceeding.

3.0 SOIL SAMPLING AND ANALYSIS PROGRAM

The nature of contamination has been previously defined in the SOW which lists four primary contaminants in soil and their respective target soil criteria (or cleanup levels). They are:

- Trichloroethylene (TCE) - 47 ppm
- 1,2-Dichloroethylene (1,2-DCE) - 70 ppm
- Vinyl Chloride - 0.9 ppm
- Polychlorinated biphenyls (PCBs) - 10 ppm

OHM will use field screening sampling to determine if contamination above the target soil criteria exists in soil at the preliminary limits of excavation. If the preliminary limits of excavation pass the field screens, soil confirmation sampling will be conducted in accordance with 40 CFR 261. If the excavation does not pass the field screens, additional excavation will be performed.

Prior to sampling in the excavation, preremoval action sampling and analysis will be performed by collecting samples from test pits. This will be performed to determine if the waste is classified as nonhazardous. The sampling procedures for the test pits and excavation are discussed in the following sections.

3.1 SAMPLE POINT LOCATION

During preremoval action sampling, a composite sample will be collected from the test pits. The test pit locations are as discussed in the Work Plan. Samples will be collected at 2-foot and 6-foot depths of each test pit for every 500 cubic yards of soil estimated to be removed. The exact location will be determined in the field.

For removal action purposes, once the excavation or portion thereof passes the field screens, a minimum of one confirmation soil sample will be collected for analysis at every 50 linear feet at the midheight of each excavation wall. Also, one sample will be taken from a 25-foot-by-25-foot sampling grid to be laid out over the base of each excavation. The proposed sampling grids for the preliminary limits of each of the work areas are shown on Figure 1.

The sampling grids will be laid out once the preliminary limits of contamination are excavated. For ease in laying out the sampling grids, control points will be surveyed outside the top of the excavation at approximately the four corners of the area to be excavated. This will be done to allow the sampling grid to expand, if needed, should the preliminary excavation limits be exceeded. Wooden stakes will be used to delineate the control points. A tapemeasure will be used to establish the grid from the control points to the top of cut of the excavation. If either the width or length of the base of the excavation is less than 25 feet within any grid, then one sample will be taken for confirmation analysis within the grid base and at every 50 linear feet, or portion thereof, along the midheight of

each wall. If the entire base of the excavation is less than 25 feet by 25 feet square, then one sample will be taken in the base area and one along the midheight of each wall. The actual location of the confirmatory sample taken from the excavation base will be determined in the field. Samples will be taken by the hydraulic excavator. The sample technician will extract a sample from the excavator bucket. Under no circumstances will the sample technician enter the excavation unless the excavation meets OSHA requirements for worker entry.

Should the preliminary excavation limits increase based on either field screening or confirmatory sampling, then the sampling grid will be extended appropriately. Confirmatory sampling will be repeated as necessary after (1) each passing field screening event and (2) until the target soil cleanup criteria are met.

3.2 SAMPLE COLLECTION

During preremoval sampling, soil samples taken from along the wall of each test pit will be collected into a mixing pan. The composite sample will be thoroughly homogenized and collected into the sample container with an approved collection spoon. One sample each for Toxicity Characteristic Leaching Procedure (TCLP) volatiles, TCLP semivolatiles, and TCLP metals will be collected into 16-ounce glass jars, respectively. One sample for PCBs/pesticides will be collected into an 8-ounce glass jar. Samples will be securely sealed with a Teflon-lined lid.

During the removal action, two soil samples will be collected from the soil in the bucket from each sampling location (described above), using an approved sampling spoon. One sample for TCE, 1,2-DCE, and vinyl chloride will be collected into a 4-ounce glass jar until full to eliminate headspace; and one sample for PCBs will be collected into a 8-ounce glass jar. Both samples will be securely sealed with a Teflon-lined lid.

Upon completion of sampling at each location, the sampling spoon will be decontaminated using the following procedures:

- Wash with nonphosphate detergent solution
- Triple rinse with tap water
- Triple rinse with pesticide--grade methanol
- Triple rinse with laboratory grade deionized water.

All decontamination water will be collected and transferred to the water treatment plant as discussed in the Work Plan. Tap water will be used from an approved source (to be defined by the NTR).

Should the preliminary limits of excavation not need to be exceeded based on field screening and confirmatory sampling, it is estimated that the number of confirmatory field samples to be taken include:

- Area 1 - 23
- Area 2 - 5
- Area 3 - 10
- Area 4 - 14
- Area 5 - 10
- Area 6 - 5
- Area 7 - 6.

In addition to confirmatory sampling in the excavation, there is a potential need to sample the excavated material for parameters required by the disposal facility. The parameters and the frequency for the sampling and analysis will be defined after selecting the disposal facility, as needed, and by any state requirements where the disposal facility is located. If the disposal facility is to be a nonhazardous facility in the State of Virginia, then the following sampling and analytical work is required for disposal approval:

- For every 100 cubic yards of soil to be removed, at least one representative composite sample of the soil for each of the following tests will be collected and analyzed:

  - Full TCLP
  - Reactive Cyanides
  - Reactive Sulfides
  - PCB - Polychlorinated Biphenyl
  - TPH - Total Petroleum Hydrocarbons
  - BTEX - Total Benzene, Toluene, Ethylbenzene, Xylene
  - TOX - Total Organic Halogens.

3.3 QUALITY ASSURANCE AND QUALITY CONTROL SAMPLES

Table 1 presents information regarding analytical methods, a summary of containers, and holding times for all soil samples. The QC samples to be collected during the site work include:

- One trip blank per shipping container for every batch of volatile organic compounds analyzed

- One field replicate/duplicate for each ten samples collected

- Two field blanks, one for tap water and one for laboratory-grade deionized water, once prior to sampling activities.

- One additional field replicate for each ten samples collected for matrix spike/matrix spike duplicate (to be prepared by laboratory).

The field blanks for tap water and deionized water will be required to verify that the water sources for decontamination of sampling equipment, etc., are not contaminated.

4.0 WATER SAMPLING AND ANALYSIS PROGRAM

A water sampling and analysis program will be implemented to characterize all water generated as a result of field work activities for on-site treatment and discharge.

4.1 DEWATERING, DRYING PAD, AND DECONTAMINATION WATER

Water generated from dewatering of the excavations, released from excavated soil on the drying pad, and generated from project decontamination operations will be sampled at the storage tank (influent water) and analyzed. The effluent water from the on-site water treatment plant at the effluent tank will also be sampled and analyzed once daily prior to discharge.

The influent and effluent water will be analyzed for those constituents in which discharge criteria have been given by the Hampton Roads Sanitation District. The constituents are: arsenic, lead, chromium, barium, cadmium, zinc, acetone, benzene, toluene, ethylbenzene, xylene, and all other toxic organics per 40 CFR 433.11(e). In addition, the influent and effluent will be analyzed for pH, hardness, iron, manganese, total suspended solids (TSS), and total dissolved solids (TDS) for use in operating the system more efficiently.

Sampling and analytical work will be conducted in accordance with appropriate procedures contained in 40 CFR Part 136. Sampling will also be performed in accordance with OHM standard procedures.

Per 40 CFR 136, field measurement of residual chlorine in water samples is required to determine preservative requirements. This will be done with field test kits meeting requirements of EPA Methods 330.4 and 330.5. If residual chlorine is present, then sodium thiosulfate will be added as preservative as outlined in Table 2. In addition, the sample bottles for influent and effluent must not be prerinsed with sample prior to collection, and automatic sampling equipment must be as free as possible of Tygon tubing and other potential sources of contamination.

4.2 QUALITY ASSURANCE AND QUALITY CONTROL

Table 2 presents information regarding analytical methods, a summary of containers and holding times for water samples. The QC samples to be collected during the site work include:

- One trip blank per shipping container for every batch of volatile organic compounds analyzed
- One field replicate/duplicate for each ten samples collected (as applicable)

- One additional field replicate for each ten samples collected for matrix spike/matrix spike duplicate (to be prepared by laboratory).

5.0 SAMPLING AND ANALYSIS PROGRAM FOR INVESTIGATIVE-DERIVED WASTE AND DEBRIS

Based on site history, it is anticipated that various construction rubble, metal debris, and miscellaneous scrap material swill be uncovered during excavation. This material will be segregated into similar matrices, porous and nonporous, and handled as discussed in the Work Plan. Ultimately, the material will be decontaminated on site by using the appropriate technology and samples of cleaned debris will be taken for disposal analysis. Metal debris will be steam cleaned or water laser washed. Concrete rubble will be rinsed and tested; depending on quantity, it may not be cleaned to noncontaminated criteria.

For construction rubble and metal debris, a minimum of one composite sample per matrix will be collected and analyzed for RCRA characteristics and full TCLP analytes as per Table 3.

5.1 DRUM MANAGEMENT

There are approximately 388 drums which are presently stored on pallets near the site access road, as shown on Drawing RA-1 - Site Operational Plan. The on-site drums contain investigative-derived wastes consisting of decontamination liquids, personal protective equipment solids, and Camp Allen Salvage Yard wastes and Area B characterization wastes. Drummed fluids generated from previous well development'/purging and decontamination activities will be treated on site through the water treatment plant. Soils and other solids (i.e., PPE) will be handled based on their designation as hazardous or nonhazardous.

After drums are emptied, the drums will be rinsed at the main decontamination pad. Rinsed drums will be staged on site for transport to a drum recycler.

The existing analytical results of the previous investigations will be used to help characterize the estimated 321 drums of solids. The drummed liquids will be sent to the on-site water treatment facility.

Of the estimated 321 drums of solids, the PPE drummed wastes will be removed and the PPE will be double bagged for off-site disposal. The remaining drummed solids will be segregated into 8 drum lots, each containing 30 or more drums. The drums will be segregated, based on all existing data. Any drum that cannot be segregated (unlabeled) will be set aside and handled appropriately as containing an unknown waste. A composite sample will be taken from each of the eight lots and sent to the laboratory for analysis.

The laboratory analysis will consist of TCLP testing for volatiles, semivolatiles, metals, and PCB/pesticides. The sampling protocols are discussed in the following paragraphs.

5.2 CONTAINERIZED WASTE SAMPLING

Sampling of containerized waste will occur only after the container has been evaluated from a health and safety standpoint. Drums which appear bulged or under pressure will be remotely opened. Any previous records, drum content labels, or manufacturers labels will be consulted before opening any container.

Initial container condition and physical waste descriptions are conducted by the OHM chemist and recorded on the Drum Inventory Log. The drum is also assigned a unique identification number for future reference at this time. This log is also used to enter the results of the field compatibility testing. OHM will evaluate the existing analytical data to determine if compatibility testing is necessary.

5.2.1 Liquid Waste

Liquids IDW are assumed to be development or decontamination water. The liquids will be emptied into the water treatment system.

5.2.2 Solid and Semi-Solid Wastes

Solids in a container will be sampled with a PVC or stainless-steel thief or trier. The thief or trier will be cautiously forced through the material to the bottom or to refusal. The sample will then be transferred to a precleaned, clear glass, 8-ounce, wide-mouth sample container. If the material must be broken up prior to sampling, a brass hammer and chisel will be used. If the material is too elastic, a piece will be cut off with a razor knife. Sampling tools used will be decontaminated between drums.

5.2.3 Buried Drum Removal

In the event that drums are uncovered during excavation, OHM will initially perform field screening with the PID, and then consult with the on-site health and safety officer and the NTR. Since the characteristics of the debris is not well defined, OHM has assumed that if any drum is encountered, it does not contain explosive or shock-sensitive material. Any partially filled or full drums that are uncovered will be removed from the excavation and staged on the drying pad.

An excavator will remove each drum and place it into the bucket of a backhoe. The backhoe will be used to transport excavated drums and soil to the appropriate staging location. Once on the staging pad, a preliminary classification checklist will be completed. The list will include a screening of the drum or container with an explosimeter, an organic vapor detector for organic vapors, a radiation survey meter for radiation, and a visual description of the drum or container, approximate volume, visual appearance and state of contents (if exposed), labeling information (if available and legible), and the condition of the drum or container as it appears in the excavation. Information indicating the generator or owner of the waste will also be recorded. This information will be included on a drum

data sheet. Each excavated drum/container will be assigned a unique number which will be recorded on the drum data sheet.

5.2.4 Spill Prevention and Response

The handling and transport of drummed or containerized waste will be, at all times, conducted in a controlled and safe manner, which will minimize damage to containers, the containerized materials, and the environment.

5.2.5 Handling of Structurally Sound Drums

If a structurally sound drum or container is excavated, and is neither open nor leaking, the container will be immediately transported to the drying area. Drums that contain both solids and liquids will be identified during segregation. Liquids will be removed into a separate drum. Drums which contain solids/sludges only, will be characterized as necessary to determine conformance with the approved waste profiles. Conforming waste will be consolidated on the drying pad, based on the characterization. If characterization is not possible, the drum will be overpacked and staged for subsequent sampling, and characterization for disposal. Drums that contain only liquids will be transferred to the appropriate staging pad for sampling and characterization.

5.2.6 Handling of Structurally Unsound Drums

Any drums which contain solid/sludge contents, and are without structural integrity, will be overpacked prior to transport to the staging area.

Free liquids from any leaking drums will be collected using an absorbent material, placed into a separate DOT-approved 55-gallon drum, and staged pending characterization of the liquid samples.

Drums containing liquid contents that cannot be moved without rupture, leaking, or spillage, will either be:

- Placed directly into a DOT-approved 85-gallon salvage drum or
- The drum contents shall be transferred to a separate DOT-approved 55-gallon drum using a portable hand pump.

Drums, which are RCRA empty after liquids removal, will be crushed and placed on the drying pad. The contents of drums that are not RCRA empty after liquids removal shall be visually characterized to determine conformance with the approved waste profiles. Drums containing conforming waste will be crushed and stockpiled on the drying pad. If visual characterization is not possible, the drum will be overpacked if necessary and staged for subsequent sampling and characterization for disposal.

5.2.7 Empty Drums, Drum Parts, and Lids

RCRA empty drums will be crushed and placed on the drying pad, as directed by the site supervisor. Excavated drum parts and lids will be placed on the drying pad, as directed by the site supervisor.

6.0 BORROW MATERIAL SAMPLING

Borrow material (backfill) for the excavated areas will be trucked to the site from a government borrow source located at the Willoughby Housing Area and Interstate 64, about 10 miles northeast of the site. Samples of the random fill borrow material will be obtained for chemical and geotechnical analysis as shown in Tables 4, 5, and 6, respectively. Upon completion of the analyses, the results will be reviewed and approved by the NTR prior to beginning any excavation/removal activities. The procedures for obtaining representative borrow material samples for analysis are described below.

6.1 RANDOM FILL

Approximately 5,000 cubic yards of random fill material will be required if the proposed excavations do not exceed the preliminary limits. Before acceptance is given by the NTR, the random fill material must satisfy the chemical and geotechnical requirements.

6.1.1 Sampling for Chemical Analysis

The sample team will obtain representative random fill samples from the random fill at a depth to be determined in the field based on the area used for borrow material.

Two soil samples will be obtained from the random fill at locations to be determined in the field, and one QC sample will be collected. One composite soil sample will be obtained from each location. A hand auger will be used to collect soil continuously down to the calculated depth. The soil retrieved from the auger barrel will be placed in a large stainless-steel mixing pan. Upon completion of the augering and soil retrieval, the soil in the pan will be mixed to form a composite, taking care to minimize soil volatilization. Each soil composite will then be transferred to two 16-ounce jars for chemical analysis as per Table 4.

The sample technician will determine the sample location from which the QC sample will be obtained. No decontamination will be performed between sampling points at a sampling location; however, decontamination of all sampling equipment will be performed between sampling locations following the procedures outlined in Section 3.2.

6.1.2 Sampling for Geotechnical Analysis

Soil samples will be obtained from two locations within the proposed random fill borrow site. Geotechnical analyses per Table 5 will be performed on these samples. A backhoe will be utilized to obtain soil samples down to the calculated average depth of excavation. Approximately 40 pounds of soil will be collected taking care to obtain an even soil distribution. If more than one soil type is encountered (excluding the topsoil layer) at either location, an additional 40 pounds of soil will be collected of each additional soil type and treated as a separate sample.

Once a representative sample of soil is obtained, it will be placed in a 6-gallon plastic bucket lined with a double plastic garbage bag. The soil will carefully be placed into the plastic bag, taking care not to damage the bag. Once the bucket is full of the soil, the bags will be tied and taped to prevent excessive moisture loss. Large rocks greater than 3 inches in any dimension will be removed from the sample and this information will be logged on the field sampling report. The lid will be placed on the bucket and sealed using duct tape or other means. The following information will be recorded in the field notes, as a minimum:

- Sampling date and time
- Name(s) of sampling team members
- Site name and sample location number
- Depth to where composite was made
- Brief description of sample (i.e., consistency, color, soil type, rocks' fragments, moisture, etc.)
- Sample identification number and amount collected
- Analyses to be performed.

In addition, labeling and shipment of the soil samples will follow the procedures detailed in Section 7.0. Upon completion of sampling, the excavation will be backfilled. The sample location markers will remain in place until otherwise notified.

6.2 TOPSOIL

OHM will sample the topsoil during the pre-removal sampling activity and analyze it for the contaminant constituents as well as the material criteria. If the topsoil is not contaminated and meets the clean criteria, it will be stripped from the excavation during the clearing and grubbing activity and stockpiled on site for later reuse during site restoration. If the topsoil does not meet the clean criteria, it will be removed and disposed with the other contaminated soil.

Approximately 400 cubic yards of new topsoil will be required to complete the site restoration at the site based on the preliminary excavation limits. If the preliminary limits are exceeded in the field, then the additional topsoil will be provided as needed. This material will be obtained from an approved source. The topsoil will be stripped at the source and stockpiled on site until the final topsoil layer is ready to be replaced. Prior to the stripping activities, however, a minimum of two topsoil samples from the source area will be obtained for pH field testing. The topsoil sampling locations will be determined in the field. Again, sample collection will be conducted using a hand auger. The samples will be obtained from ground surface to within 6 inches below grade.

Prior to the final topsoil placement, a sample of the stockpiled topsoil will be collected and sent to an agricultural laboratory, to be named, for nutrient analysis. A grab sample from two locations on the pile will be obtained and shipped to the agricultural laboratory. Proper chain-of-custody and shipment procedures will be followed as discussed in Section 7.0.

7.0 SAMPLE SHIPMENT PREPARATION

The purpose of this section is to establish the procedures to be implemented for sample shipment. The basis for all procedures is understood to follow the CQCP. The following sections describe:

- Sample containers
- Sample preservation
- Sample chain-of-custody procedures.

7.1 SAMPLE CONTAINERS

Different types of containers will be used to collect samples for the sampling media including:

- Glass 4-ounce and 8-ounce bottles with Teflon-lined caps (soil samples)
- Glass 1-liter bottles with Teflon-lined cap (water and soil samples) and glass 40-milliliter vials with Teflon-lined septa lids (water samples only)
- Polyethylene 1-liter and 500-ml bottles with plastic lids.

The laboratory will provide cleaned containers prior to shipment to the field. Sample preservation, containers, and sample holding times are summarized in Tables 1 through 4.

7.2 SAMPLE PRESERVATION

The purpose of sample preservation is to prevent or retard the degradation/transformation of chemicals in the sample during transport and storage. The samples will be preserved in the field at the time they are taken. Tables 1, 2, 3 and 4 list preservation requirements for the samples.

All sample containers will be filled as completely as possible to minimize headspace. Samples will be stored and shipped to the laboratory at 4 degrees Celsius.

7.3 CHAIN-OF-CUSTODY PROCEDURES

The following will be used in the chain-of-custody process for sample tracking and field activities:

- Sample identification and labeling
- Sample chain-of-custody form
- Sample collection log.

7.3.1 Sample Identification and Labeling

All samples will be adequately marked for identification from the time of collection and packaging through shipping and storage. Marking will generally be made on the sample container (jar, bottle, etc.) but may be applied directly to the sample or on a tag or label attached to the sample or container, depending on the type of sample and its intended use. Sample identification will include, as appropriate:

- Project name and number
- Sample number
- Sample location (e.g., depth or sample interval, and field coordinates)
- Sampling date and time
- The initials of the individual(s) performing the sampling
- Sample preservation used.

7.3.2 Chain-of-Custody Record

Documentation of the sample chain-of-custody is provided by the use of a chain-of-custody record that includes the sampling location, the type and amount of samples collected, the date and time of sample collection, the name(s) of the person(s) responsible for sample collection, the date and time of all custody transfers, the signature of the persons relinquishing and accepting sample custody, laboratory request for analysis, and other pertinent information.

Chain-of-custody procedures document sample possession from the time of collection to disposal. A sample is considered in custody if it is:

- In one's physical possession
- In view, after being in physical possession
- In a locked area so that no one can tamper with it, after having been in physical custody
- In a secured area, restricted to unauthorized personnel.

A chain-of-custody record will be initiated in the field by the sample technician and will accompany each group of samples during shipment to the laboratory. Each time custody of the sample changes, the new custodian will sign the record and indicate the dates of transfer. An example of an OHM chain-of-custody record is included in Appendix A.

If the samples are shipped to the laboratory by commercial carrier, the original chain-of-custody form will be sealed in a water-tight container, placed in the shipping container, and the shipping container sealed prior to giving it to the carrier.

If the samples are directly transported to the laboratory, the original chain-of-custody form will be kept in possession of the person delivering the samples.

For samples shipped by commercial carrier, the waybill will serve as an extension of the chain-of-custody record between the final field custodian and receipt in the laboratory. (The carrier waybill number will be written on the chain-of-custody form. If the original chain-of-custody form is sealed in the shipping container before the waybill number is received, then this number will be written on the copy of the chain-of-custody form.)

Upon receipt in the laboratory, the receiving technician or representative will open the shipping containers, compare the contents with the chain-of-custody record, and sign and date the record. The receiving technician will also record the carrier and waybill number of the original chain-of-custody form, if it is not already present.

All original chain-of-custody records, analytical data, and other project documentation will be maintained in a project file. Project files will be stored in a central filing system pending disposition by the Navy.

A legible copy of the field chain-of-custody record will be maintained in the field office on site. Once samples are received in the laboratory, chain-of-custody records will be signed by a designated representative of the laboratory and copies of the signed chain-of-custody records will be submitted to the field office or other designated representative.

7.3.3 Sample Collection Log

A sample collection log is prepared for each sample to record information pertaining to the location and collection of a sample. The following information is required on the sample collection log, as appropriate:

- Unique sample number
- Sample location
- Collector's initials
- Date and time of sample collection
- Sample coordinates
- Sample identification (type, media, sequence, blank, spike, duplicate, split).

An example of a sample collection log is provided in Appendix A.

7.3.4 Analytical Laboratory

Upon sample receipt, the receiving technician or designee will:

- Examine all samples and determine if proper temperature has been maintained during shipment. The receiving temperature will be recorded on the chain-of-custody record. If samples have been damaged during shipment, the remaining samples will be carefully examined to determine

whether they were affected. Any samples suspected of being affected will also be considered damaged. It will be noted on the chain-of-custody record what specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified in writing as soon as possible of an estimate of the cause of damage, the samples that were damaged, and whether they must be resampled or the testing program revised.

- Compare samples received against those listed on the chain-of-custody record.

- Verify that sample holding times have not been exceeded. If the sample holding time has been exceeded, the receiving technician or designee will notify the field personnel by telephone that this has occurred and will follow up with a Nonconformance Report.

- Sign and date the chain-of-custody record and attach the waybill to the chain-of-custody record.

- Place the samples in adequate laboratory storage.

- Enter the samples in the laboratory sample log-in book which contains the following information:

  - Project identification number
  - Sample numbers
  - Type of samples
  - Date received in laboratory.

- Notify the analytical manager or group leaders of sample arrival.

- Place the completed chain-of-custody records in the project file.

If samples collected arrive without chain-of-custody or with incorrect chain-of-custody records, the following actions will be undertaken by the receiving technician:

- If the chain-of-custody record is incorrect, a memorandum to the project manager, site supervisor, manager of the laboratory, and appropriate field personnel is prepared stating the deviations. The memorandum must be signed and dated by the person originating the chain-of-custody and by the receiving technician. The memorandum will serve as an amendment to the chain-of-custody. If the information on the chain-of-custody record cannot be corrected by the receiving technician, the samples affected will be removed from the sampling program.

- If the chain-of-custody record is not shipped with the samples, the field personnel will be contacted and a memorandum prepared which lists the persons involved in collecting, shipping, and receiving the samples and the times, dates, and events. Each person involved must sign and date this memorandum. The completed memorandum will be maintained in lieu of the chain-of-custody record.

TABLES

TABLE 1

SUMMARY OF CONTAINERS, PRESERVATION, AND HOLDING TIMES FOR SOIL SAMPLES

Parameter	*Bottle Requirements*	*Preservation Requirements*	*Holding Time*	*Analytical Method(1)*	*Bottle Volume*
FROM TEST PITS:					
TCLP Volatiles TCLP Semivolatiles TCLP Metals	Glass, teflon-lined cap Glass, teflon-lined cap Glass, teflon-lined cap	Cool to 4°C Cool to 4°C Cool to 4°C	14 days 14 days 14 days	EPA 1311 EPA 1311 EPA 1311	1 x 16 oz. 1 x 16 oz. 1 x 16 oz.
PCBs/Pesticides RCRA Characteristics(2)	Glass, teflon-lined cap	Cool to 4°C	Extraction within 7 days; analyze 40 days	EPA 8080	1 x 8 oz.
FROM EXCAVATION:					
Trichloroethylene, 1,2-dichloroethylene Vinyl Chloride	Glass, teflon-lined cap	Cool to 4°C	10 days	EPA 8180	1 x 4 ounces
PCB/Pesticides	Glass, teflon-lined cap	Cool to 4°C	Extraction within 7 days; analyze 40 days	EPA 8080	1 x 8 ounces

Notes:

(1) Standard EPA Methods, and in accordance with 40 CFR 136, as appropriate.

(2) Test pit samples to be analyzed for PCBs/Pesticides will also be analyzed for RCRA characteristics: reactivity, corrosivity, and ignitability.

Other Notes:

Additional analytical parameters, which may be required for soils removed from the excavation, will be determined by the selected disposal facility and by any state requirements for that specific disposal facility.

TABLE 2

SUMMARY OF CONTAINERS, PRESERVATION, AND HOLDING TIMES FOR WATER SAMPLES

Parameter	*Bottle Requirements*	*Preservation Requirements*	*Holding Time*	*Analytical Method(1)*	*Bottle Volume*
Volatile Organic Compounds (VOCs)[2]	Glass vials with Teflon-lined septum caps	Cool to 4°C; adjust pH < 2 with HCl, H_2SO_4 or solid $NaHSO_4$. If residual chlorine is present, collect soil in 4 oz. soil VOA container which has been pre-preserved with 4 drops of 10% sodium thiosulfate; gently mix sample and transfer to a 40 ml VOA vial[1]; cool to 4°C	14 days	EPA 8240	2 x 40 ml
Semivolatile Organic Compounds (SVOCs)[2]	Amber glass with Teflon-lined cap	Cool at 4°C[5]	Extract within 7 days, analyze within 40 days	EPA 8270	2 x 1 liter
Acrolein and Acrylonitrile	Glass vials with Teflon-lined septum caps	Adjust pH 4-5; cool at 4°C	14 days	EPA 8270	2 x 40 ml
Arsenic, Lead, Chromium, Barium, Cadmium, Zinc[3]	Polyethylene	Adjust pH 4-5; cool to 4°C	6 months	EPA 6010	1 x 500 ml
Pesticides/PCBs	Amber glass with Teflon-lined cap	Cool to 4°C[5]	Extracted within 7 days, analyze within 40 days	EPA 8270	1 x 1 liter
2,3,7,8-TCDD	Amber glass with Teflon-lined cap	Cool to 4°C[5]	Extracted within 7 days, analyze within 40 days	EPA 8280	1 x 1 liter

TABLE 2

(CONTINUED)

Parameter	*Bottle Requirements*	*Preservation Requirements*	*Holding Time*	*Analytical Method(1)*	*Bottle Volume*
TSS	Polyethylene or glass	Cool to 4°C	As soon as practical	EPA 160.1	1 x 1 liter
TDS[4]	Polyethylene or glass	Cool to 4°C	As soon as practical	EPA 160.2	1 x 1 liter

Notes:

TSS = Total Suspended Solids.
TDS = Total Dissolved Solids.

(1) Standard EPA Methods, Reference SW846, and in accordance with 40 CFR 136 and 40 CFR 433.11, as appropriate.

(2) All VOCs, SVOCs, and pesticides/PCBs per the toxic organics list, 40 CFR 433.11.

(3) Influent and effluent water will also be analyzed in the field for pH, hardness, iron, and manganese which may be measured from the sample collected for the metals analyses.

(4) The sample collected for TDS will be filtered in the field-filtered for nonrepresentative particles (i.e., No. 16 mesh or equivalent to window screen mesh).

(5) If residual chlorine is present, add 3 ml 10% sodium thiosulfate per gallon.

TABLE 3

SUMMARY OF CONTAINERS, PRESERVATION, AND HOLDING TIMES FOR INVESTIGATIVE-DERIVED WASTE

Parameter	*Container Requirements*	*Preservation Requirements*	*Holding Time*	*Analytical Method*	*Sample Quantity*
Construction rubble and metal debris:					
TCLP Volatiles, Semivolatiles, and Metals	Glass jar	Cool to 4°C	14 days	EPA 1311	1 x 8 oz. (min. 100 grams)

Note:

The sample(s) collected for TCLP metals analysis will also be analyzed for RCRA characteristics of reactivity, corrosivity, and ignitability (40 CFR 264).

TABLE 4

SUMMARY OF CONTAINERS, PRESERVATION, AND HOLDING TIMES FOR IMPORTED SOIL SAMPLES

Parameter	*Bottle Requirements*	*Preservation Requirements*	*Holding Time*	*Analytical Method(1)*	*Bottle Volume*
Borrow Fill:					
TCLP Volatiles	Glass, teflon-lined cap	Cool to 4°C	14 days	EPA 1311	1 x 16 ounce
TCLP Semivolatiles	Glass teflon-lined cap	Cool to 4°C	14 days	EPA 1311	1 x 16 ounce
TCLP Metals(2)	Glass teflon-lined cap	Cool to 4°C	14 days	EPA 1311	1 x 16 ounce
PCB/Pesticides	Glass, teflon-lined cap	Cool to 4°C	Extraction within 7 days; analyze 40 days	EPA 8080	1 x 8 ounce

Notes:

TCLP = Toxicity Characteristic Leaching Procedure.

(1) Standard USEPA Methods, and in accordance with 40 CFR 136, as appropriate.

(2) RCRA characteristics of reactivity, ignitability, and corrosivity (40 CFR 264) will be determined from the sample collected for metals analysis.

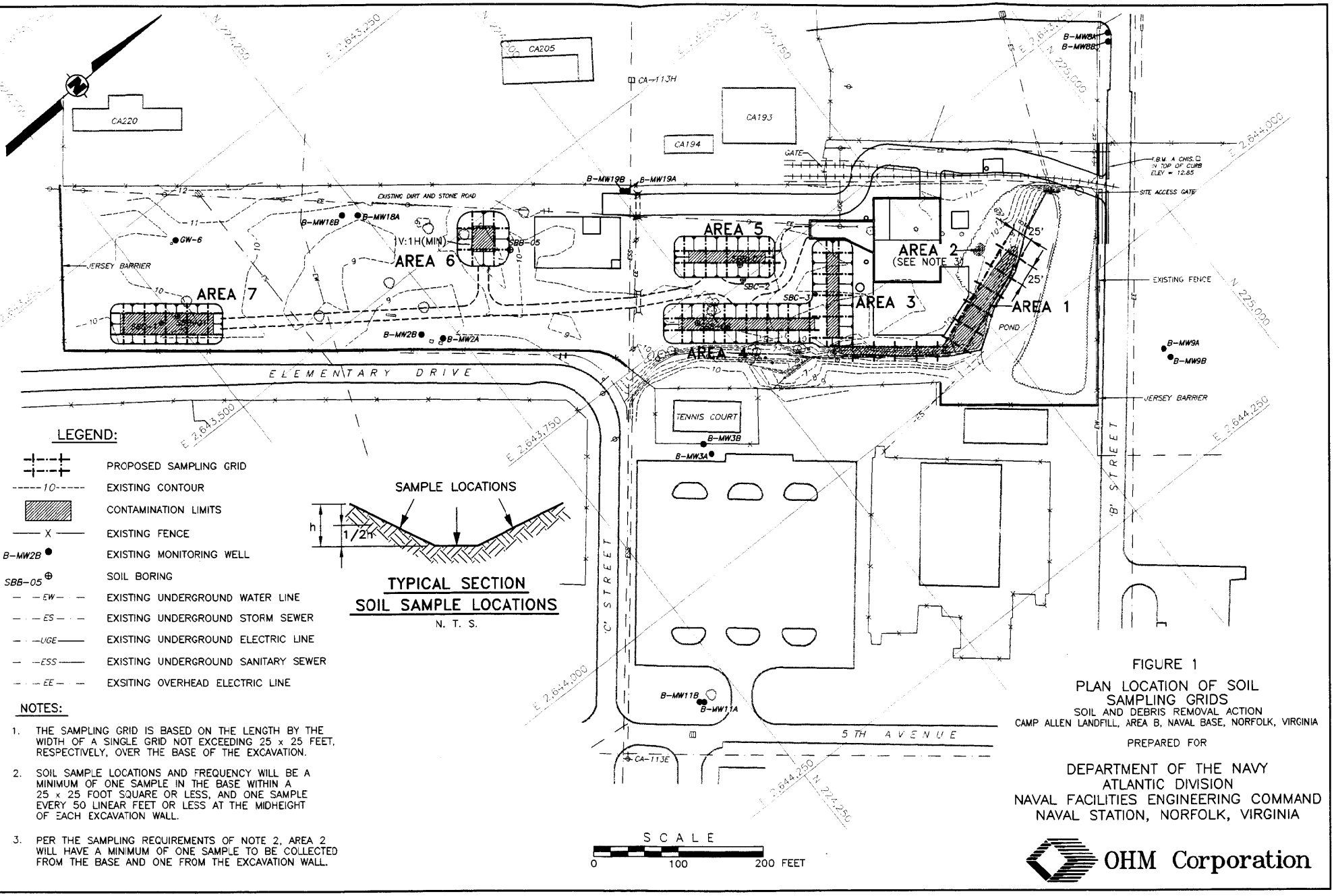
TABLE 5

SOIL VERIFICATION PLAN

Facility Component	*Factors to be Inspected*	*Inspection Method*	*Test Method Reference*	*Section of Construction Specs, Containing Test Requirements*	*Frequency of Testing*
EARTHWORK:					
Random Fill from Borrow	Soil Type Geotechnical	Visual-Manual Procedure	ASTM D 2487	2220-3	Ongoing
		Grain Size	ASTM D 1140 ASTM D 422	2220-3	1 test/type
		Atterberg Limits	ASTM D 4318	2220-3	1 test/type
		Compaction	ASTM D 698	2220-3	1 test/type
Random Fill Layer (Placement)	Soil Type Geotechnical	Visual-Manual Procedure	ASTM D 2487	2220-10	Ongoing
	In-Place Moisture Content	Oven-Dry or Nuclear Method	ASTM D 2216 ASTM D 3017	2220-10	1 test/lift
	In-Place Density Relationship	Sand-Cone or Nuclear Method	ASTM D 2922	2220-10	1 nuclear density test/lift

FIGURES

FIGURE



LEGEND:

- PROPOSED SAMPLING GRID
- 10 EXISTING CONTOUR
- CONTAMINATION LIMITS
- X EXISTING FENCE
- B-MW2B EXISTING MONITORING WELL
- SBB-05 SOIL BORING
- EW EXISTING UNDERGROUND WATER LINE
- ES EXISTING UNDERGROUND STORM SEWER
- UGE EXISTING UNDERGROUND ELECTRIC LINE
- ESS EXISTING UNDERGROUND SANITARY SEWER
- EE EXSITING OVERHEAD ELECTRIC LINE

TYPICAL SECTION
SOIL SAMPLE LOCATIONS
N. T. S.

NOTES:

1. THE SAMPLING GRID IS BASED ON THE LENGTH BY THE WIDTH OF A SINGLE GRID NOT EXCEEDING 25 x 25 FEET, RESPECTIVELY, OVER THE BASE OF THE EXCAVATION.
2. SOIL SAMPLE LOCATIONS AND FREQUENCY WILL BE A MINIMUM OF ONE SAMPLE IN THE BASE WITHIN A 25 x 25 FOOT SQUARE OR LESS, AND ONE SAMPLE EVERY 50 LINEAR FEET OR LESS AT THE MIDHEIGHT OF EACH EXCAVATION WALL.
3. PER THE SAMPLING REQUIREMENTS OF NOTE 2, AREA 2 WILL HAVE A MINIMUM OF ONE SAMPLE TO BE COLLECTED FROM THE BASE AND ONE FROM THE EXCAVATION WALL.

SCALE
0 100 200 FEET

FIGURE 1

PLAN LOCATION OF SOIL SAMPLING GRIDS
SOIL AND DEBRIS REMOVAL ACTION
CAMP ALLEN LANDFILL, AREA B, NAVAL BASE, NORFOLK, VIRGINIA

PREPARED FOR

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NAVAL STATION, NORFOLK, VIRGINIA

OHM Corporation

OHM CORPORATION PITTSBURGH, PA	DRAWN BY	CHECKED BY	APPROVED BY
	A.C.Smith 12/20/93	JVG 3-11-94	JWC 3-11-94

DRAWING NUMBER 15444-B2

PLOT SCALE: 1" = 1'

APPENDIX
A

APPENDIX A

CHAIN OF CUSTODY AND SAMPLE COLLECTION FORMS

OHM Corporation

CHAIN OF CUSTODY RECORD

Project Number _____ Page _____ of _____

Project Name _____

Site Location _____

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE TYPE	SAMPLE LOCATION	VOLUME COLLECTED	NUMBER OF CONTAINERS							COMMENTS

RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	REMARKS:		

Distribution–Original accompanies shipment, copy to project files.

SAMPLE TYPE:
W–WATER, S–SOLID, A–AIR, O–OTHER

LABORATORY:

NOTE: ALL SAMPLES ARE TO BE INSPECTED FOR PHYSICAL INTEGRITY UPON RECEIPT BY THE ANALYTICAL LABORATORY.

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OHM Corporation

SOIL SAMPLE FIELD COLLECTION REPORT

Project Number _____

Project Name _____

Site Location _____

Collected By _____ Date and Time Collected _____

Sample Location _____

SAMPLE(S) LOCATION SKETCH (use back side if necessary)

SAMPLE ID NUMBER	DEPTH OF SAMPLE	SOIL DESCRIPTION (color, composition, staining, odor, field measurements[1])

Sampling Method _____

Composite Sample ? Y ☐ N ☐ Composite Sample ID Number _____

Describe Compositing _____

SAMPLE TYPES COLLECTED

TYPE[2]	VOLUME	PER SAMPLE ?	PER COMPOSITE ?
		Y ☐ N ☐	Y ☐ N ☐
		Y ☐ N ☐	Y ☐ N ☐
		Y ☐ N ☐	Y ☐ N ☐
		Y ☐ N ☐	Y ☐ N ☐

Number of Containers _____

Date Received By Lab _____ Laboratory _____

Remarks: _____

(1) For Example, Organic Vapor Analysis, Pocket Penetrometer, Etc.

(2) For Example, Metals, VOA, Organics, Etc.

OHM Corporation

WATER SAMPLE FIELD COLLECTION REPORT

Project Number _____
Project Name _____
Site Location _____

Sample ID Number _____ Date Collected _____
Sample Location _____ Time Collected _____
Diameter of Well _____ (in.) Collected By _____
Depth to Bottom of Well _____ (ft.) Casing Stick Up _____ (ft.)
Static Water Level _____ (ft.), Measured From (1) _____
Well Volumes Purged _____, Purging Method (2) _____
Type of Sample (3) _____, Sampling Method (4) _____
Depth of Sample _____ (ft.), Measured From (1) _____
Sample Collection Order _____

FIELD MEASUREMENTS

Water Temperature _____ pH _____
Specific Conductance _____ umho/cm at _____ (Temperature)
Other _____

METER CALIBRATION

pH STD	METER READING	SP. COND. STD	METER READING	_____/STD	METER READING

SAMPLE TYPES COLLECTED

TYPE (5)	VOLUME	FILTERED	PRESERVATION (6)
_____	_____	Y ☐ N ☐	Y _____ N ☐
_____	_____	Y ☐ N ☐	Y _____ N ☐
_____	_____	Y ☐ N ☐	Y _____ N ☐
_____	_____	Y ☐ N ☐	Y _____ N ☐
_____	_____	Y ☐ N ☐	Y _____ N ☐

Number of Containers _____
Date Received by Lab _____ Laboratory _____
Remarks: _____

(1) T.O.C.=Top of Protective Casing; T.O.W.=Top of OF Well Casing; G.S.=Ground Surface
(2) Bailed, Pumped, Air Lift, Etc.
(3) Stream, Pond, Spring, Well, Seep, Supply, Etc.
(4) Bailer, Kemmerer, Grab, Pump, Etc.
(5) General Chem., Metal, VOA, Organics, Etc.
(6) HNO^3, NaOH, H^2SO^4, $Na^2O^3S^2$, Etc.

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FIELD ACTIVITY DAILY LOG

Project Number _____

Project Name _____

Date _____ Page ____ of ____

Field activity subject

Description of daily activities and events

Visitors on site	Changes from plans and Specs, and other special orders and important decisions
Weather conditions	Important telephone calls

Personnel on site

Field engineer Date

OHM Corporation

TEST PIT CLASSIFICATION LOG

Project Number _____

Project Name _____

Test Pit Number _____

Elevation _____ Location _____ Page _____ of _____

Engineer/Geologist _____ Equipment Used _____ Date Started _____

Perched/GWL Data: Date _____ Depth _____ Actual Time _____ Date Completed _____

Date _____ Depth _____ Actual Time _____ Date Backfilled _____

Pit Dimensions: _____ (length) x _____ (width) x _____ (depth) = _____ (volume)

DEPTH ( )	SAMPLE TYPE & NO.	DESCRIPTION	U.S.C.S. SYMBOL	REMARKS

OHM Corporation

PROJECT NAME _____ PROJECT NO._____

SAMPLE LOCATION _____

BORING/WELL NO. _____ DATE _____

DEPTH OF SAMPLE _____ TIME TAKEN _____

COLLECTOR'S NAME _____

SAMPLE TYPE: ☐ GROUNDWATER ☐ SURFACE WATER
☐ SOIL ☐ SLUDGE/WASTE

PARAMETERS _____ PRESERVATIVE _____

BOTTLE _____ OF _____ ☐ FILTERED ☐ NONFILTERED

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TEST EQUIPMENT LIST

TEST _____

EQUIPMENT NUMBER	EQUIPMENT NAME

NOTE:

THIS LIST SHALL BE COMPLETED FOR ALL TESTS, ONLY EQUIPMENT SUBJECT TO CALIBRATION NEED BE LISTED.

OHM Corporation

REAL TIME INSTRUMENT CALIBRATION LOG

Project Number _____

Project Name _____

Site Location _____

Instrument _____ Manufacturer _____ Instrument Serial No. _____

DATE/ TIME	TEMP.	BAR. PRESS.	% REL. HUMID.	GAS STD (NAME)	STD CONC (ppm)	ATTEN. SPAN SET/ SENS. CAL.	ZERO CHECK	METER READING (ppm)	COMMENTS	ANALYST SIGNATURE

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OHM Corporation

REAL TIME AIR MONITORING LOG

Project Number _____

Project Name _____

Site Location _____

DATE	ANALYST	TIME	INSTRUMENT (MFG/MODEL/ SERIAL NO.)	CALIBRATION DATE & CPD.	COMPOUND MEASURED	SPAN SET OR SENS. CAL.	CONC. (UNITS)	LOCATION/ACTIVITY/COMMENTS

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OHM Corporation

AIR SAMPLE COLLECTION REPORT

Project Number _____

Project Name _____

Site Location _____

Sample ID Number _____ Date Collected _____

Sample Probe Location _____ Collected By _____

Depth to Bottom of Probe(1) _____ (ft.) Ambient Temperature _____

Is Water Level Present? ☐ yes ☐ no Water Level (1) (if present) _____ (ft.)

Weather Conditions _____

PURGING DATA

Purge Pump ID Number _____ Purge Start Time _____

Calibrated Purge Rate _____ (ml/min) Purge End Time _____

Volume of Air Purged _____ (liters) _____

SAMPLE COLLECTION

Sampling Pump ID Number _____ Sampling Start Time _____

Calibrated Sampling Rate _____ (ml/min) Sampling End Time _____

Volume of Air Sampled _____ (liters)

Number of NIOSH Tubes _____

NIOSH Tube Labels: _____ , _____ , _____

_____ , _____ , _____

Remarks: _____

Notes: (1) Depth below top of well casing.

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AIR SAMPLE COLLECTION REPORT

Project Number _____

Project Name _____

Site Location _____

Sample ID Number _____ Date Collected _____

Sample Probe Location _____ Collected By _____

Depth to Bottom of Probe(1) _____ (ft.) Ambient Temperature _____

Is Water Level Present? ☐ yes ☐ no Water Level (1) (if present) _____ (ft.)

Weather Conditions _____

PURGING DATA

Purge Pump ID Number _____ Purge Start Time _____

Calibrated Purge Rate _____ (ml/min) Purge End Time _____

Volume of Air Purged _____ (liters) _____

SAMPLE COLLECTION

Sampling Pump ID Number _____ Sampling Start Time _____

Calibrated Sampling Rate _____ (ml/min) Sampling End Time _____

Volume of Air Sampled _____ (liters)

Number of NIOSH Tubes _____

NIOSH Tube Labels: _____ , _____ , _____

_____ , _____ , _____

Remarks: _____

Notes: (1) Depth below top of well casing.